Tectonic setting and geochronology of Eisgarn granitoids (Moldanubian Plutonic Complex): implications for late-Variscan evolution of the Moldanubian Zone, Bohemian Massif

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We consider new geochronological, structural and AMS data of Eisgarn-type two-mica granites of the Mrákotín and Klenov plutons (Moldanubian Plutonic Complex) to interpret emplacement and regional LP–HT late-Variscan geodynamic event in the central part of the high-grade Moldanubian Zone.

Two-mica Eisgarn-type granitoids of the Mrákotín and Klenov plutons have a relatively uniform major-element geochemical signature and characteristic of fractionated, peraluminous high-K granites formed by partial melting of a metasedimentary source. Single-grain $^{207}Pb/^{235}U$ analyses of monazite from the Mrákotín and Klenov plutons yielded a weighted mean of 326.98 ± 0.27 Ma (MSWD = 1.3) and 327.14 ± 0.21 Ma (MSWD = 0.9) respectively. These geochronological data indicate igneous crystallization of both plutons. In case of host migmatites the $^{207}Pb/^{235}U$ dates are slightly, but significantly older, with a weighted mean of 328.90 ± 0.13 Ma (MSWD = 0.3). Microstructures of these granitoids are exclusively magmatic and show no evidence for solid-state deformation. Abundant host rock xenoliths are enclosed in both Klenov and Mrákotín plutons. The blocks are chiefly rectangular, bounded by knife-sharp planar contacts that are at high angle to each other and truncate the metamorphic foliation inside the blocks. In total, over 500 oriented samples for analysis of magnetic anisotropy (AMS) were taken from the Klenov and Mrákotín plutons. Eisgarn-type granites are characterized by relatively low degree of anisotropy, the values of P parameter range between 1.04 and 1.1, the shape of the AMS ellipsoid is mostly oblate. Magnetic foliations in the Mrákotín pluton are homogeneous in a flat-lying orientation across the body, corresponding magnetic lineations plunge in ~WNW–ESE trend. In the Klenov pluton, the observed magnetic foliations dip moderately to the WNW to NNW, magnetic lineations plunge to the ~NE or ~SW. Magnetic fabrics in the Klenov pluton are roughly parallel to the mapped intrusive contacts and orientation of regional metamorphic fabrics in the host migmatized paragneisses of the Monotonous Unit. The Mrákotín pluton was emplaced into upper-crustal level of the exhumed high-grade Moldanubian rocks (P = 0.35 GPa, T = 500–600 °C) and proves a crucial role of magmatic stoping during magma ascent and emplacement. The flat-lying magnetic fabrics in the Mrákotín pluton reflect regional strain-field increment in later stages of pluton crystallization. In contrast, the Klenov pluton was emplaced at the identical time-span but into deeper parts of the exhumed crust closely related with development of mid- to upper-crustal ~NNE-SSW metamorphic fabrics. These data indicate that the host metapelitic crust in the central part of the Moldanubian Zone underwent a rapid exhumation of migmatite core-complex at ~329–327 Ma, producing large volumes of the "Eisgarn" S-type granites.